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Discussion on the valuation of biological assets: fair value vs. historical cost.

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Abstract

The international accounting standards harmonization has changed the valuation model in agricultural accounting adopting a fair value model while replacing other techniques such as historical cost. The aim of this research is to analyze both valuation models for biological assets (fair value or historical cost), as well as, which one of them better show the true and fair view of the financial statements. Several empirical studies illustrate that usually fair value presents transparent, accurate and reliable information. This model has a clearly preference in his application despite of the historical cost model is the most used. This accounting method enhance the information because it links the biological transformation with the biological assets. Additionally, fair value accounting model improves the preparation of financial statements and the process of making decisions.

Key Words: Biological asset, Agriculture, Fair value, Historical Cost, Financial Statements

JEL Classification: D80, M41, Q56

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1. Introduction

As Rozentāle and Ore (2014) stated “Agriculture provides the population with livelihood. It promotes commercial activities and sustainable employment in rural areas, thus improving the living quality and retaining density of rural population”, it is important to keep this sector active, for it, exist numerous policies that helps companies, entities and self-employed people engaged in this activity to improve their conditions. Specifically, there are accounting rules that arise to unify the accounting regulations between the different countries of the world, (Ivanova, n.d.)[1] that remark “unification of accounting means diminishing differences in approaches to accounting methods of economic operations, events, and conditions”.

The goal of the present study is to compare the different valuation methods for biological assets. Particularly, fair value and historical cost accounting methods and the effects that produce each one of them in the financial statements. Then, the research will analyze various articles and empirical investigations. Finally, this academic writing argues which of these valuation methods it is more appropriate to use, which illustrates the fair and true view of the financial reports and, consequently, which is helpful to enhance financial decisions.

This study will focus on the comparison of both measurement methods from the theoretical point of view analyzing the positive and negative aspects, the empirical study in not within the scope of this research.

Finally, this paper is organized as follows. The first section explains the main aspects of IAS 41: Agriculture, such as his creation procedure and the reasons of that or the process of agricultural activities. The second section is divided into two main points, the first point focus on Fair value measurement and the second point on Historical cost valuation method, both points illustrates the main advantages and disadvantages of these accounting methods and his principal consequences in the financial statements. The third section, exposes the differences between both methods analyzing and comparing their positive and negative aspects and, at last, a revision of various empirical investigations of other authors and

[1] cited in Rozentāle and Ore (2014)

concluding which valuation method is appropriate to use, which presents accurately the true view of the financial statements and the trends in Spain respect the use of these methods.

2. Overview of IAS 41: Agriculture

At first in the following step will take a general outlook about IAS 41 agriculture, the next paragraphs indicate some important definitions in the scope of this IAS, a scheme of the process of agricultural activities and a brief description of the two principal groups of biological assets.

This current days in a globalization world a few regulations tend to give a framework to companies to regulate their reporting performance, income, capital structure and unify numerous kinds of evaluation system in the practice (Dékán and Kiss, 2015). Then, arise a commonly accepted rule-system, the International Financial Reporting Standards (IFRS) previously called the International Accounting Standards (IAS) (Bácsné Bába, 2014)[2].

The International Accounting Standard Boards (IASB) issued the IFRS guidelines and rules for organizations and companies for the preparation of financial statements (Hellman 2008). These rules consolidates the comparability of the information in the financial statements (Dékán and Kiss, 2015).

Mesén Figueroa (2007) claim that usually in the financial statements of companies engaged into agricultural activities such as silviculture, poultry, floriculture, fish farming or farming vineyards, the plants and animals have been accounting as inventories or property, plants and equipment. However, with their characteristics the living creatures cannot be stay in that balance sheet. With this fact in 2001 the IASB publish the International Accounting Standard (IAS 41) “Agriculture” which establish that farming, field and animals engaged with agricultural activity must be appear in biological assets balance sheet to improve the accounting practices in agricultural activities, this standard became effective in 2003.

[2] cited in (Dékán and Kiss, 2015)

Further, it is important underline some definitions in the scope of IAS 41 (Anon., 2009):

- “Agricultural activity is the management by an entity of the biological transformation of biological assets for sale, into agricultural produce or into additional biological assets.”
- “Biological transformation comprises the processes of growth (quantity gain or animals or plants quality improvement), degeneration (decrease in quantity or animals or plants quality deterioration), production and procreation (rise of other animals or plants) that cause qualitative or quantitative changes in a biological asset.”
- “Biological asset is a living animal or plant.”
- “Agricultural produce is the harvested product of the entity’s biological assets.”

Moreover, Sedláček (2010) stated that there are some practices to exploit more efficiently the crops “Biological transformation is facilitated by the management of change through improvement or at least stabilization of the conditions necessary for the realization of a particular process (e.g. nourishment level, humidity, temperature, fertilizing and light conditions”.

In addition, it is relevant highlight what is agricultural activity and what is not, for example, handling recreational activities such as game parks and zoos is not agricultural activity because not lead to transformation or alteration of the biological assets. Ocean fishing from unmanaged source is not agricultural activity. However, growing plants for pharmaceutical drugs or biotechnology entities is agricultural activity within the scope of IAS 41 (Anon., 2009)

Furthermore, Bohusova and Svoboda (2017) argues that understanding with IAS 41, there are two principal groups of biological assets, on the one hand, the consumable biological assets, for instance wheat and cattle for beef, which are harvested as agricultural produce, and, on the other hand, bearer biological assets such as plants or fruits that self-regenerate.

Moreover, Sedláček (2010) pointed out that animals and plants usually are subdivided as other assets in the balance sheet according to the life cycle, in other words, into long-term and short-term. The assets with long-term life cycle habitually are used by the company during one year or more than one year and this type of assets should be content some conditions to recognize in the balance sheet, various of this requirements

are, for instance, the asset will bring an economic benefit in the future, the asset have a market price and the owner of the asset has freedom to control and manage the future benefits (see Figure 1)

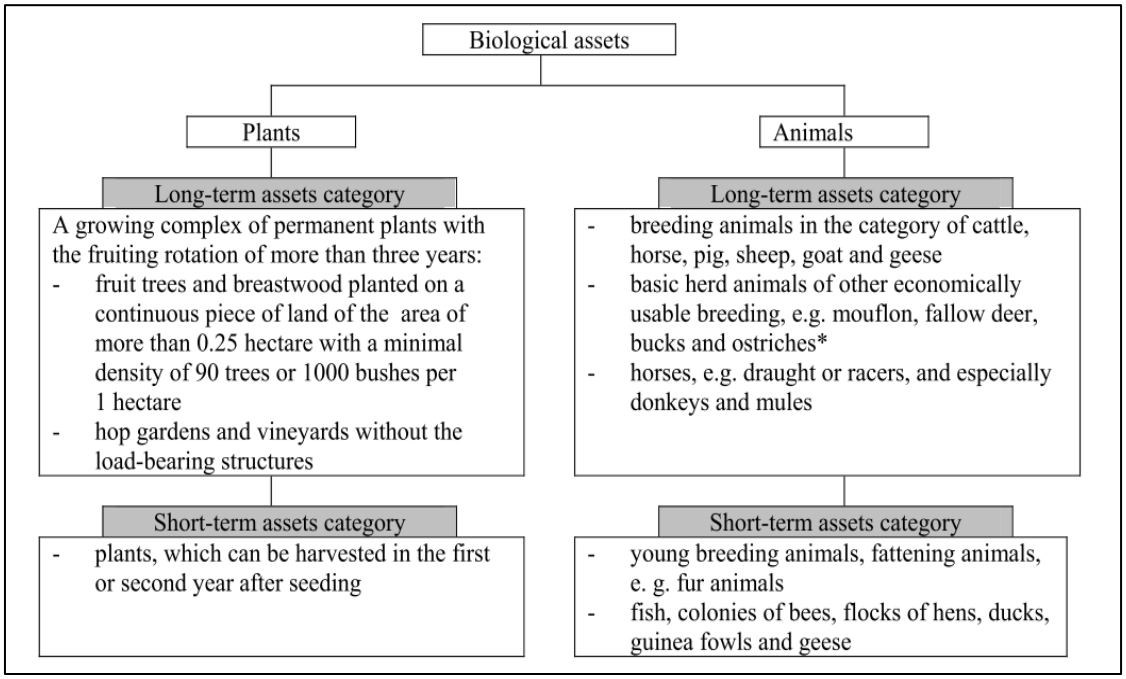

Figure 1: Biological assets classification scheme

Source: (Sedláček, 2010)

The flow diagram (Figure 2) shows the process of agricultural activities. It is important highlight that IAS 41 Agriculture only follows the process of agriculture movements at the point of harvest, so IAS 41 treats the administration of biological assets and agricultural output at this point. Then IAS 2 Inventories manage the process gained after the harvesting and IAS 41 cannot be applied in this case. IAS 41 control the biological assets or agricultural outcome with biological alteration as growing, ageing, production and procreation that results in a converted version of another biological asset or a new agricultural produce which can be recognized and gauged. IAS 41 give a framework for the measurement and define the assets value, their preparation in the financial statements and provide information about their physical changes affect to future economic income. (Mates *et al.*, 2015)

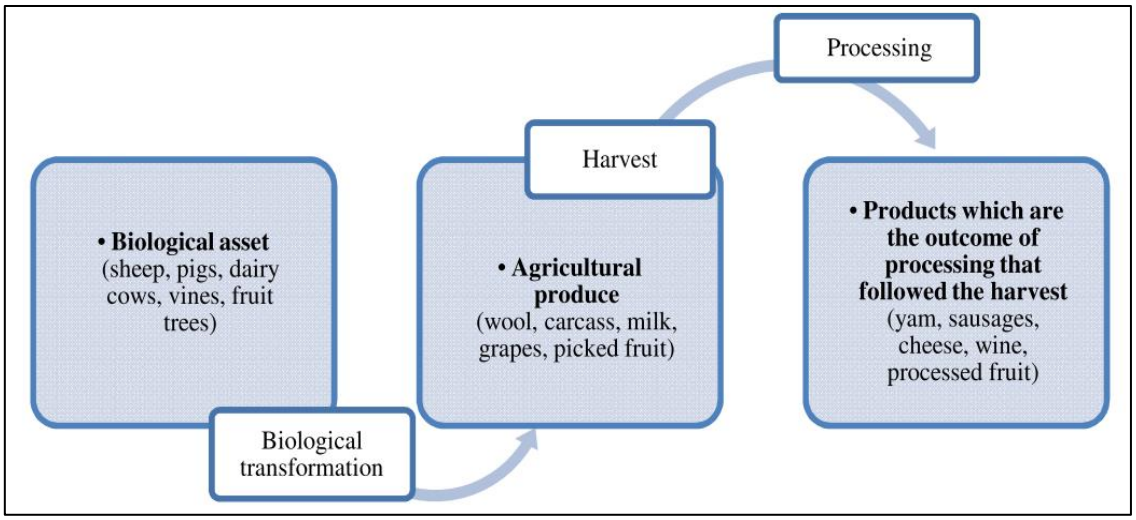

Figure 2: Process of agricultural activities

Source: (Dékán and Kiss, 2015)

Moreover, Figure 3 shows the valuation model for biological assets. They are measured at fair value less estimated cost with the guidelines of IAS 41 until harvest. After harvest, assets are recognized as inventories with IAS 2.

Finally, IAS 41 highlight the treatment of many costs incurred relating to the agricultural activity in the course of the biological transformation procedure such as planting, weeding, irrigation or harvesting are reported as expenses in the period incurred. (Bohušová, Svoboda and Nerudová 2012)

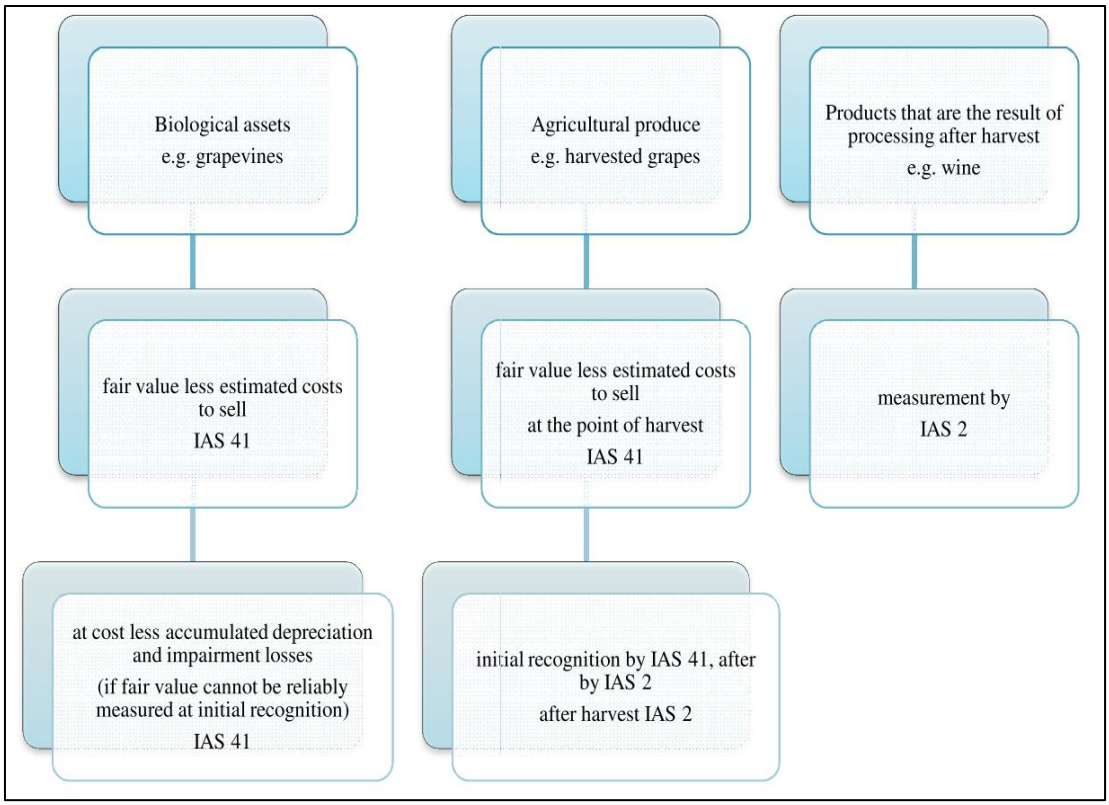

Figure 3: Measurement of biological assets and agricultural produce by IAS 41 and IAS 2
Source: (Dékán and Kiss, 2015)

3. Fair Value

In the next step, the main aspects of fair value measurement as well as its principal benefits, drawbacks and consequences in the financial reports are underlined.

3.1 Overview

On the one hand, Mesén Figueroa (2007) pointed out that Biological assets in first recognition and subsequent dates at balance sheet are measured at fair value less cost to sell; in case differences arise between the original value and the succeeding measurements, biological assets should be recognized as profit or loss in the relevant accounting period. Fair value can be defined as **"the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date, both parties enter the transaction freely and knowledgeably"** (Anon., 2012; Chen, 2018). Moreover, costs to sell are the increase costs provoked by the assets sell operations, include charge paid to regulatory agencies,

harvest and transport costs until market, fees paid to dealers and brokers or transfer taxes and obligations. Nevertheless, it not includes finance cost or income taxes.

On the other hand, IAS 41 establish a hierarchy to determine Fair value less cost to sell (Anon., 2009):

- Price for the asset in an active market (price in an organized market or stock market).
- Recent transaction price for the asset if there is no active market.
- Market prices for equal or similar assets, adjusted for the points of variance.
- Sector benchmarks.
- Present value of the future cash flows expected to be generated from the asset.

(Anon., 2009) stresses that usually biological assets have suitable and available market prices or values, this is because of the biological produce normally are basic commodities that are frequently treated, for instance, veal or wine grapes usually have an active market and this leads to generate market prices.

Notwithstanding, when biological assets do not have suitable market prices or accessible values, the present value of expected net cash flows from the assets it is habitually used. This method estimates fair value with the expected cash flows of the asset in a current place and conditions, moreover, the cash flows will be established as far as possible considering market data. (Anon., 2009)

Furthermore, Martins (2002)[3] stresses that in inefficient market conditions, it is more advantageous estimate fair value by the present value of future cash flow, indeed, working with valuations based on estimations grant to the supervisors more facilities to manage and control the outcome. Therefore, Martins (2002) advice that in case the market is not efficient, the market price normally is not associated with fair value due to the information used to establish the price may be influenced by the parts, the seller and the buyer. In this situation, should not be associate the fair value of the assets with the market value.

[3] Cited in Cavalheiro, Kremer and Gimenes (2017)

Further, according to Mesén Figueroa (2007) in case that an entity has more than one principal market for the same asset or liability, should be use the price of the market that expect operate those assets.

In addition, Bohusova and Svoboda (2017) stated that determine fair value using the present value of cash flows expected to be generated from the assets result in a high volatility in the level of costs of the bearer assets. This volatility is caused by external factors such as the influence of climatic conditions, e.g. (rainfall or spring frosts), incidence of diseases and pests, volatility in the price market of bearer assets or the volatility in the output per hectare.

Finally, it is important underline the circumstances where an entity can depart from using fair value. One of these exemptions is the early stage of an asset life, for instance when assets have little biological transformation since the initial cost incurred. The other exemption state that fair value cannot be measured assuredly for a biological asset. (Anon., 2009)

3.2 Advantages

Some important main reasons to adopt fair value less cost to sell to measure biological assets are for instance, the direct relation established between the biological transformation process and the changes of the future economic benefits expect for the biological assets. It attains that the financial statements report true and reliable financial information, results of operations and cash flows, in other words, the entity can recognize periodically and gradually the income acquire, for example, from the possession of plants for harvest and the increase in the qualitative or quantitative value. (Mesén Figueroa 2007)

According with Mesén Figueroa (2007) other advantages of the fair value measurement is the periodical recording of the qualitative and quantitative development of biological assets, thus, the recognition of the profits and losses earn by his property. It consequently allows ascertain better the profitability associate with the entity operations and profits and losses as it demands IAS 18 Revenue.

Further, Mesén Figueroa (2007) state that usually biological assets are negotiated at market price, this is because of the production cycle are long and have a significant volatility at the productive and commercial environment, which generates sharp

fluctuations prices at short term, in this case as previously described, fair value recognize this movements and grant true and reliable accounting information and financial statements.

Moreover, Daly and Skaife (2015) suggest another factor to consider in fair value measurement, if required, the biological asset can be replaced during the transformation process. At any stage of the lifecycle there are some biological assets that can be more easily substituted and readily valued based on market operations because of these types of biological assets is not connected to the land, for instance, poultry, horses, aquaculture, livestock or fur-bearing animals.

Other positive aspect claimed by the empirical study of Argilés, Sabata and García (2012) is that in case the biological assets have an active or operative market, Fair Value measurement is simpler and useful instrument to prepare accountant information and improve users decisions, this study will be detailed in the last section.

3.3 Disadvantages

Mesén Figueroa (2007) conclude that the adoption of fair value less cost to sell as measurement of biological assets in case the assets do not have an active market, introduces a higher complexity in the elaboration of the financial statements and the financial information, it can be explained because of the periodical measurement of the biological assets and the use of sophisticated techniques for this valuation. Due to this complexity some entities tend to engage consulting services to elaborate the accounting information and financial statements.

Further, according to Bohusova and Svoboda (2017) there are some problems when fair value is use. One of these problems is that occasionally, it is difficult to find an active or liquid market for a biological asset and then it is laborious to determine fair value for this biological asset. Another problem related to the previous one is the cost connected regularly to the application of fair value, as before say exist a hierarchy to determine the fair value less cost to sell but sometimes it would be very tedious to find it, especially when the biological assets do not have an active market. in this case the firms tend to lean on consulting services.

Another important drawback pointed out by Bohusova and Svoboda (2017) is the volatility in the market prices produced by external factors as the impact of climatic

conditions such as, rainfall, spring frosts, blizzards or other circumstances for example, diseases or pests. These phenomenons leads to sharply fluctuations in the market prices of the biological assets.

In addition, Bohusova and Svoboda (2017) pointed out the possible profit manipulation because of the subjective approach in fair value measurement method due to is linked with market prices and this market value can be deal between the buyer and seller, in this case the true view of accounting information and financial statements is not reflected and can make the shareholders and stakeholders take worse decisions.

The main points in favor and against the fair value assessment are summarized below (Table 1)

Table 1: General Assessment of FVA Model

Positive argument	Negative argument
Fair value information enhances decision usefulness and transparency, as it is timely reflected in current market conditions (Fisher et al., 2010).	FVA comes at the expense of reliability and understandability, referring to the need to sometimes use somewhat arbitrary market-based values that rely on subjective means of establishment (Barlev & Haddad, 2003; Penman, 2007; Benston, 2008; as cited in Fisher et al., 2010, p. 1).
An asset is reflected in the balance in its fair value, if its prime cost is smaller than its market price (Kalniņa, 2006).	How to determine the costs of ascertaining such values, particularly for reporting entities in the developing countries (Fisher et al., 2010)
	The annual revaluation requirements imposed by IAS 41 might prove difficult and expensive, particularly in less developed countries (Elad, 2004; as cited in Fisher et al., 2010, p. 4).
	The undesirable effects of increased volatility of the reported earnings (Fargher, 2001; Penman, 2007; as cited in Fisher et al., 2010, p. 1).
	Fair value does not always reflect the true economics of business (Fisher et al., 2010).

The importance of analytical financial information increases for its users (Kuzmina, 2006).	The extension of FVA to a range of assets, industries, and countries has raised concerns about the ability of one measurement system to be all things to all stakeholders, with many of the key requirements being tailored to assets where active market is prevalent (e.g., financial instruments) (Penman, 2007; as cited in Fisher et al., 2010, p. 1).
	Increased company income tax risk for small and medium companies, where accounting is done mainly for fair tax calculation reasons (Kalniņa, 2006).

Source: Rozentāle and Ore (2014)

3.4 Consequences in the financial statements

The initial and subsequent measurement at fair value less cost to sell of the biological assets entails a few effects at the financial statements. Mesén Figueroa (2007) pointed out that Fair value measurement cause a substantial improvement or deterioration in the profitability and leverage index. At previously described, it can be explained because of the periodical adjust of the biological assets value at balance sheet, assessing profit or loss originate by the qualitative and quantitative changes in the biological assets.

Furthermore, according with Mesén Figueroa (2007), over taxation, the treatment of profits and losses of biological assets originated by his property, understanding with IAS 12 Income taxes, the gains and losses usually must be enrolled as non-taxable income or non-deductible expenses, producing temporary differences for income tax, in other words, fair value measurement not affect the tax base of the income tax. Nevertheless, the sale of biological assets or agricultural products produced by the biological assets will tax the profits or deduct the losses, therefore it affects the tax base of income tax and in this case the financial statements, particularly in the profit and loss account.

In addition, the application of the fair value less cost to sell as measurement of the biological assets, show the increasing incorporation of IAS - *International Accounting Standards,* thus the measurement it is more dynamic, what is more, useful and reliable for enhancing financial and economic decisions of the shareholders and stakeholders. (Mesén Figueroa 2007)

The table below (Table 2) explains the positive and negative aspects of fair value accounting method from the point of view of reliability.

Table 2: Assessment of FVA Model from the Point of View of Reliability

Positive argument	Negative argument
IAS 41 provides "a good conceptual framework" for meeting the information needs of different stakeholders, but some practical difficulties should be noted in operationalizing the standards" (Fisher et al., 2010, p. 4).	The principal concern is when active markets for biological assets do not exist. In such instances, reporting entities may have to estimate fair values by determining the net present values (NPVs) of future cash flows, yielding inherently subjective valuations (Fisher et al., 2010, p. 4). Unlike an objective value from an external market, net present value is highly dependent on the discount rate and growth projections used in the calculation (Dowling & Godfrey, 2001; as cited in Fisher et al., 2010, p. 4).
	FVA application to certain non-severable biological assets, such as grapevines, may result in "false or misleading statements and a reduction in trusting the presentation of relevant financial information" (Fisher et al., 2010, p. 4).
	For many assets and obligations assessed by FVA, market prices are not available (Kuzmina, 2006).
	Problems of mathematical calculations of hypothetical market prices (fair value) (Kuzmina, 2006).
	The accountants face the problem of defining the market values –what exactly is it? Defining the market value is subjective to a certain extent (Dziļuma, 2000).

Source: Rozentāle and Ore (2014)

4. Historical Cost

In this step will underline the main characteristics of historical cost measurement and the principal advantages, disadvantages and its consequences in the financial statements.

4.1 Overview

On the one hand, as Kelton (2018) stated “A historical cost is a measure of value used in accounting in which the price of an asset on the balance sheet is based on its nominal or original cost when acquired by the company”.

On the other hand, according to Kelton (2018) before the IASB issued the International Accounting Standards, especially IAS 41 agriculture, assets were measured according to GAAP (Generally Accepted Accounting Principles) at historical cost. Under this method the assets are kept in the balance sheet at historical cost, even if they have significant changes in value over time.

Bohusova and Svoboda (2017) note that before the International Standard Boards set fair value as a method of valuation of biological assets, the historical cost was the most usual method, that is to say, the historical cost was the ruling basis measurement method because of his easiest application compared to other estimation methods.

The main characteristics of both valuation models, fair value and historical cost, are summarized in Table 1.

Table 3: Comparison of Value Calculation Methods

Criterion	**Historical cost**	**Fair value**
Value calculation at the moment of recognition and each date of balance	Purchase cost = purchase price + associated costs or production cost = direct costs + indirect costs	Fair value = market value – calculated sales costs
Depreciation	Is assessed	Is not assessed
Value changes	In case of value decrease according to the lowest value or in case of value increase according to the highest value	Included in the profit and loss account
Additional provisions	None	Active market exists or it is possible to state the fair value by other recognized methods

Source: Rozentāle and Ore (2014)

4.2 Advantages

On the one hand, according to Kelton (2018) some advantages of valuing biological assets at historical cost are for example, the prevention of overstating an asset value when the asset operates in a volatile market, thus prevents of a high loss.

On the other hand, this author underline that a positive aspect of the historical cost measurement is the facility and simplicity in their application (in case that the assets do not have an active market to link the assets with market prices) since it is not necessary to reference to market values. In other words, the historical cost model helps to prepare financial information and financial statements more quickly and efficiently saving costs and time when the biological assets do not have an active market. Further, the theory of historical cost accounting is easier to understand because it is objective, verifiable and reliable, so that users (stakeholders and shareholders) without any financial knowledge can also interpret the financial statements more clearly. (Francis 2013)

In addition, according with Francis (2013) the historical cost method it is more difficult to manipulate because of the historical cost record the assets based upon the original price and this amount can be confirmed with a receipt or invoice.

4.3 Disadvantages

It is important stress the disadvantages of historical cost measurement. A critical drawback is the stability of the value of the biological assets at balance sheet over time and it does not take inflation or changing prices into account. In other words. An asset acquired by the entity is recorded in the balance sheet at original value over time as previously said. In the case of biological assets, companies do not recognize a profit or loss until harvest and that collection sometimes is twelve years after planting, so during that time the value is not updated. Furthermore, the entities do not recognize the increase in value of the biological assets, for example, the increase in value due to the growth and maturation of plants and animals. (Mesén Figueroa 2007)

Moreover, in relation to the previous drawback, the inalterability in the value of biological assets leads to a theory of historical cost accounting that does not show the true value of the assets and, consequently, the true and fair view of the financial statements. (Francis 2013)

In addition, Francis (2013) pointed out that historical cost does not provide sufficient impairment provisions on assets, which means more, lacks a good mechanism to replace fixed assets because depreciation is charged to the original cost of the assets and not to the value of acquisition, so that the amount is not adequate to replace the asset in the future.

Finally, another important negative aspect is that historical cost determines the profits unfairly because the entities' income is recorded in the current amount and the costs or expenses are recorded at historical cost. That means an overstatement of benefits, for example, in inflation periods. Then, the income statement in the financial reports do not show the true and fair view of the company. (Francis 2013)

4.4 Consequences in the financial statements

As Kelton (2018) stated, historical cost means that assets and liabilities are recorded at their acquired value and this value remains over time even if the asset value fluctuates during his life cycle. On the one hand, in case that the asset is sold, it generates a profit or loss between the differences of the value recorded at historical cost in the balance sheet (net of any accumulated depreciation) and the received amount when the asset is sold. On the other hand, in case of an asset is written off a loss less of any accumulated depreciation, should be recognized.

In addition, Francis (2013) pointed out that the permanence and stability in the value of assets during his life cycle affect the benefits recorded in the financial statements, particularly the income statement, the benefits are overestimated because of the profits are recorded on current amount and the expenses at historical cost and that leads to the income statement does not illustrate the fair and true profit. Consequently, in this case the financial statements do not show the true and fair view of the entity and, what is more, the users (stakeholders and shareholders) cannot make accurate decisions.

Finally, Francis (2013) highlight that historical cost model has a poor depreciation system. This is produced by the charged on original amount of the fixed assets and this quantity is not sufficient to replace the assets.

5. Comparison and discussion

5.1 Which valuation model is better? (Contrast)

This part of the written assignment will focus on the comparison of both measurement methods. We are going to compare their positive and negative aspects in the circumstances described above. Finally, based on this comparison we analyze which can be better and which better shows the true and fair view of the financial statements.

Firstly, according to Bohusova and Svoboda (2017) comparing the two forms of measurement, fair value usually shows better the increase in value and biological transformation throughout the production cycle. In fact, the fair value establishes a relation between the biological transformation process and the changes in future economic benefits that are expected, therefore, the company periodically recognizes the income obtained by the increase of value. On the contrary, historical cost records an asset in the balance sheet with the original cost and not update this amount until harvest, that is, this measurement does not recognize the fluctuations of the value of biological assets.

In addition, models based on historical cost project the depreciation of assets as a permanent or temporary cut in benefits such as losses or anticipated losses during the specific accounting period. But, as Sedláček (2010) stated “According to the standard IAS 41, a change of the physical characteristics of a living animal or plant during the course of agricultural activity expressed by a fair value change directly increases or decreases an agricultural enterprise (a farm’s) economic profit”. Then, the fair value model better illustrates the reality since the initial and subsequent assessment of the biological assets is rough to the market value. Sedláček (2010) highlights “The international accounting standards prefer the fair and true view to the principle of prudence in the accounting valuation process”.

Secondly, as described above, a major disadvantage of the fair value measurement is the high complexity in the preparation of the financial information and financial reports caused by the periodic updating of the value of assets. For example, when assets do not have an active market it is difficult to determine their fair value. Consequently, the companies usually hire consulting services to save cost and time.

However, historical cost measurement in this case is easy and simple to apply and is an objective method because is not linked with changes in market values. With this accounting method, in the balance sheet, the asset is registered at the original price over time and leads to a quick and efficient preparation of the financial statements. Therefore, when assets do not have an active market, historical cost is a useful method for users who do not have financial knowledge because they can interpret the financial reports neatly and clearly. However, if there are active markets, fair value method is useful for preparing accounts and improving financial decisions.

Thirdly, linked to the stability in the value of the assets measured with historical cost, this method is more difficult to manipulate because the assets are recorded at the original price and this amount can be verified with a receipt or invoice. Nevertheless, the fair value is more subjective than historical cost because this assessment is connected with market prices and, sometimes, the buyer and seller agree on the purchase or sale price, which can lead to profit manipulation.

Furthermore, sometimes inevitable external factors or circumstances such as diseases, pests or climatic conditions cause volatility in the market prices and these usually produce losses. As Cavalheiro, Kremer and Gimenes (2017) stated “Such risks can therefore reduce the reliability and consequently the relevance of the financial information”. However, historical cost measurement prevents the fluctuations of the assets value due to this model of assessment not update the value of the assets.

To conclude, both assessment methods have advantages and disadvantages. On the one hand, fair value recognizes more frequently the increase in the value of the biological assets because of the biological transformation. So, this method usually illustrates better the true and fair view of the financial statements since balance sheet shows a value of biological assets updated and closer to reality. As a consequence, this improves the information available to users that can improve their decisions. But this method is difficult and tedious to apply as well as hard to understand for users and, sometimes, it is necessary appeal to consulting services in case that there are no active markets. On the other hand, the historical cost method is an objective method and generally is more helpful and easy to understand for users since it saves time and costs when assets do not have an operative market. However, this method records the assets at original cost in the balance sheet over time even though their value changes. In addition, the IAS get up for accurate and true view of the financial statements, so in this case the fair value achieves these premises and then, is more convenient to use them.

5.2 Comparison with other studies and articles (Examples)

In this section we analyze some comparative empirical studies of different aspects of both valuation methods. Finally, a brief conclusion about these studies is presented.

On the one hand, Argilés, Sabata and García fulfill a comparative study about the problems in accounting preparation and making decisions using both measurement methods. This study compares empirically the reliability of these valuation methods and the difficulties faced by accountants and farmers in applicating and understanding both procedures.

The results of this research shows that fair value is more helpful than historical cost in both cases, to improve making decisions judgement and to enhance accounts preparation. The participants involved in this investigation had more problems developing accounts with historical cost than fair value due to they made more miscalculations with historical cost model. They had meager judgment with historical cost method making hazardous and less appropriate decisions.

Additionally, the researchers interviewed the participants and they revealed a strong preference to fair value accounting model. This valuation method establishes facilities to biological assets valuation at first and subsequent assessment. In addition, the preparation of accounts and the calculation of the income accounting period is easier with this method because it eludes complexities of valuation techniques such as, LIFO or FIFO for controlling different costs.

Nevertheless, one important negative aspect of fair value is that there are no active markets for some biological assets. Elad and Herbohn (2011)[4] pointed out the difficult applicability of this measurement, especially in developing countries where is hard to find an active market for biological assets.

Finally, it would be appropriate to highlight other advantage of fair value accounting model. This positive aspect is the connection with market prices and the participants explained it in the interviews of the experiment “Many farms that attempt to apply (or disclose) HC valuations ultimately rely on market values. For example, in some cases the accountants admitted to calculate HC through market price minus the percentage

[4] cited in Argilés, Sabata and García (2012)

applied in the Spanish tax procedure to get the profit for tax calculations. One of the accountants argued that applying the market price is the simplest and most efficient procedure for valuation, because it is seldom higher than cost in agriculture". (Argilés, Sabata and García 2012)

The table below (Table 4) illustrates the positive and negative aspects of fair value method from the point of view of relevance.

Table 4: Assessment of FVA Model from the Point of View of Relevance

Positive argument	Negative argument
Including unrealized gains or losses in the reported profits provides users with more timely information that is relevant to assess their investment and the efforts of management over the period (Herbohn, 2005; as cited in Fisher et al., 2010, p. 4).	There is frequently too much uncertainty regarding the ultimate realisation of many agricultural revenues (Herbohn, 2006; as cited in Fisher et al., 2010, p. 4).
Income fluctuations reflect investment risks in the agricultural sector. (Fisher et al., 2010).	Allowing recognition of estimates in income statements could result in significant adjustments in subsequent periods and may create pressure on companies to declare and pay dividends for which no funds are available (Herbohn, 2005; as cited in Fisher et al., 2010, p. 4).
It gives a more proper basis for the estimation of future cash flows compared with historical cost, as it reflects the current market value of these cash flows (Kuzmina, 2006).	This allows greater opportunities (and motivation) for companies to massage their accounts in any financial year, depending on whether they wish to show higher or lower earnings (Herbohn, 2006; as cited in Fisher et al., 2010, p. 4). Therefore, income management sphere distinctly increases when subjective valuation methods are required.
It minimizes the risk of accounting policy (or the risk of fair valuation) (Kuzmina, 2006).	Active markets are essential for valuating relevant objects, and consequently the provision of qualified professional assessors (Kuzmina, 2006).
It minimises the risk of relevance of managerial activities regarding optimization of taxes (Kuzmina, 2006).	It increases the institutional risk (coordination of administrative bodies regarding regulation) (Kuzmina, 2006).

Source: Rozentāle and Ore (2014)

On the other hand, Argilés, Garcia and Monllau accomplish two empirical studies about the evidence on the predictive ability of both measurement methods in accounting information and the implications for the quality of financial information.

The research question of these investigations was the predictability of earnings and cash flows may help supervisors to reduce agency problems such as, adjust inventories and resources, augment or cut down production, foresee financial problems, arrange funding or improve judgement in financial statement.

Moreover, for this goal they use two samples of farms, 13 farms use fair value assessment and 334 applicate historical cost valuation. In addition, the experiment has a short proportion of fair value method because of the requirements from spanish accounting standards which use historical cost valuation.

The results of these researches reveal no significant differences in future cash flow predictive power using fair valuation model in comparison with historical cost method. Thus, the accounting information do not present differences in his relevance to enhance judgement in making financial decisions. In the contrary, the analysis illustrates higher preferences for biological assets assessed with fair value because it produces lower volatility of assets values in subsequent periods and also usually it does not affect volatility of revenues and earnings. Furthermore, the empirical evidence claim that fair value accounting provides significant information content than historical cost.

At last, Argilés, Garcia-Blandon and Monllau (2011) maintain that fair value has the benefit of simplicity in his valuation model, especially when are reliable and available market prices, so fair valuation is useful and simple to extend the use of accounting rules in the agricultural sector.

Other study realized by Daly and Skaife (2015) relate the cost of debt, in other words, “the total amount of interest that a company pays over the full term of a loan” (Prakash 2019) with the measurement methods because of financial accounting information is used by creditors. In addition, it analyzes the credit capital due to it is a decisive funding source for companies engaged in agriculture.

Moreover, this research investigates publicly a traded ventures engaged on agricultural activities. It discovered that more than half of this companies register their biological assets applying historical cost because of they prepare their financial reports under national accounting standards, the statistics indicate a highly leveraged, smaller businesses by market capitalization and slower growing for enterprises that record their biological assets at historical cost in comparison with fair value. It concludes that this accounting method produces credit relevant, provides meaningful estimate of future cash flows to be derived from the assets and it is associated with a higher cost of debt than historical cost accounting.

Finally, Hadiyanto, Puspitasari and Ghani (2018) achieve a study that examine the relationship between the financial reporting quality with the accounting measurement methods for biological assets, in this case, fair value and historical cost valuation.

For this, the authors accomplish a investigation using a sample of Malaysian plantation companies, specifically, entities from the Palm Oil Growers. Various firms of this sample do not have adopted fair value measurement due to the difficulty in recognition attributes of biological assets and consider that the biological assets which do not have market value is expensive in time and costs.

Table 5: MAPE

MAPE	Group	Mean	Z	*p* value	Conclusion	Information
MAPE 1	Historical cost	0.678	−0.789	0.430	*H0* accepted	Not significant
	Fair value	0.677				
MAPE 2	Historical cost	5.308	−1.819	0.069	*H0* accepted	Not significant
	Fair value	1.559				
MAPE 3	Historical cost	5.595	−1.915	0.055	*H0* accepted	Not significant
	Fair value	1.674				

Source: (Hadiyanto, Puspitasari and Ghani 2018)

Furthermore, despite the results are not statistically significant, MAPE (Table 1) shows that entities using fair value measurement for biological assets have lower MAPE. It means that the predicting ability of the fair value is higher compared to the historical cost and leads to more relevant information.

The results illustrates that volatility in financial information is higher in companies that use historical cost accounting and fair value produces more relevant information that allows investors to make decisions accurately.

To conclude, these researches claimed that using and applying fair value measurement would afford accurate and transparent information due to the reflection of market prices and these leads to helpfulness information to enhance the presentation of financial reports and improve the financial decisions. Further, these studies stated that fair value would help the companies in mitigating the complexity of the biological assets valuation.

However, as Argilés, Garcia-Blandon and Monllau (2011) stated “There is a lack of agreement about the advantages and drawbacks of this movement”. Indeed, it produces controversy among practitioners, there are a lot of authors that stand up for fair value accounting and others that criticize this type of valuation go for traditional accounting methods.

Examples of this stated in Cristea (2009) “There are sceptics (e.g. Joint Working Group of Banking Associations on Financial Instruments, 1999) and with enthusiastic supporters of fair valuation (e.g. Chartered Financial Analyst Institute, 2007)”, as well as, other important authors cited in Cristea (2009) that supported fair value measurement, such as Barth et al (2001) or Landsman (2007) “fair value based information is more relevant than historical cost based information” and other authors that condemn this accounting method, for instance Watts (2003) or Rayman (2007) “fair value accounting is liable to produce nonsenses and baffling information”.

6. Conclusion

This study has clearly illustrated the main aspects of biological assets valuation. It exposes the most important positive and negative aspects of fair value and historical cost accounting methods and compare their benefits and drawbacks with the support of other empirical studies.

In conclusion, fair value has a lower application in Spain and other countries due to spanish accounting standards take historical cost valuation into account. Additionally, there are a lack of agreement between the experts about the positive and negative aspects of fair value accounting model. It is empirically proved that this method, when biological assets have an active market with suitable and available market prices, usually

helps to eliminate complications produced by historical cost. These complexities are for example, a lot of miscalculations. Fair value model takes out the most important negative aspect of historical cost valuation, the stability of the biological assets value over time.

Furthermore, fair value takes the biological transformation of the assets into account, in other words, connect the biological assets value with the process of growth, degeneration, production and procreation that change qualitatively or quantitatively the biological assets. Additionally, this valuation is reliable and accurate due to it is connected with market prices negotiated in the biological assets active markets.

In addition, fair value model produces transparent, reliable and accurate information and these leads to improve the presentation of financial statements. As a consequence, it helps the users (stakeholders and shareholders) to enhance financial decisions that increase the value of their entities.

Finally, fair value enhances a lot of aspects of historical cost accounting method. But it is not ideal either because of fair value have important drawbacks, such as finding active markets for specific biological assets and it is necessary to find alternatives. Other line to investigate is an alternative accounting method for biological assets valuation, various authors suggest the discounted cash flow (DFC) method to investigate.

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